

REMARKS

The specification has been amended in order to correct grammatical and idiomatic errors contained therein. No new matter has been added.

In order to expedite the prosecution of the present application, the subjects matter of Claims 1-5 have been combined and represented as newly added Claim 9. No new matter has been added.

Claims 1-5 and 8 have been rejected under 35 USC 103(a) as being unpatentable over JP '783 in view of Watanabe. Claims 6 and 7 have been rejected under 35 USC 103(a) as being unpatentable over JP '783 in view of Watanabe and further in view of Langer et al. Applicants respectfully traverse this ground of rejection and urge reconsideration in light of the following comments.

The present invention is directed to an apparatus for producing a mold. The apparatus comprises a measuring device for measuring a shape of a mold material produced by casting, a computer in which measurement data from the measuring device is inputted and a mold working machine controlled by the computer to work the mold material and produce a mold from the mold material. The computer comprises storage means for storing the measurement data, mold design data and working capability of the mold working machine, computing means for computing data for making the mold working machine work a reference plane and thereafter computes data for making the mold working machine work the product forming plane with the worked reference plane as a supporting surface of the mold material in the mold working machine to reduce the work amount of the product forming plane of the mold material based on the measurement data and mold design data, display means for displaying an envelope model of the mold material generated based on the mold design data and operation means for bringing the envelope model into close proximity of the mold model by moving the envelope model in directions of three axes

orthogonal to one another and rotating it around the three axes, and by its being in close proximity thereof, the computation to reduce the work amount of the product forming plane is performing in the computing means, bringing the envelope model into close proximity of the mold model means placing all parts of the mold model inside the envelope model and bringing a product forming plane of the envelope into close proximity of the product forming plane of the mold model, and after computing what portions of the product forming plane are worked and how many times they are worked, based on the working capability data, the computing means makes the mold working machine work the product forming plane.

As discussed in the present specification, the instant invention is directed to an apparatus which produces a mold by machining a mold material produced by casting and can be used for the production of a mold for pressing work, injection molding and other molds. Conventional methods for producing molds require machining, such as cutting work for a long period of time to finish a cast material that is intended to be a mold. It has been sought to reduce the margin of the mold requiring work in order to reduce the machining time for a mold member but even when numerically controlled working machines or the like have been used for production, the production of a mold having a high precision cannot be expected when a casting is used as the mold member and as a result, the mold margin requiring work is not sufficiently reduced, which makes it impossible to reduce the machining time. The presently claimed invention was arrived at in order to overcome these problems.

In the present invention, when the product forming plane is worked, the worked reference plane is made the supporting surface in the mold working machine which enables work to be performed with the reference plane being supported and fixed on a table of the mold working machine, thereby making it possible to machine the product forming plane while being stabilized and providing a high precision. Additionally, when

the product forming plane is worked by the mold working machine, the product forming plane is worked after the decision as to what portions of the product forming plane are to be machined and how many times they are machined. This makes it possible to finish the production of the product by machining only the portions with larger working margins of the product forming plane twice and by machining the portions with smaller working margins only once. As a result, air cutting time, in which the cutter is moving but not working on the mold member, is reduced. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

JP '783 discloses a numerical control device for a machining center which comprises a machining allowance recognizing member for recognizing the difference between the Z value of the raw material form data of a work obtained by scanning a tracer head 20 on the work depending on a program for digitizing, and the Z value of an input finishing form data, as a machining allowance. A roughing locus generator generates a roughing processing locus of roughly processing the machining allowance recognized automatically along the line of the scanning. As stated by the Examiner, this reference does disclose a measuring device, a computer and a computer mold working machine. However, the remaining aspects of the present invention are not disclosed by this reference and so for a proper showing of prima facie obviousness under 35 USC 103(a), the secondary references cited by the Examiner must supply the missing teachings. It is respectfully submitted that the secondary references contain no such teachings.

The Watanabe reference discloses a CAD device for designing molding pieces which comprise a software stored in the main memory, a graphic defining command, a plate setting command, a component database registering command, a component mounting command, a plate separating command and a numerical control data generating command. However, this reference does

not disclose computing means for computing data making the mold working machine work a reference plane and thereafter computes data from making the mold working machine work the product forming plane with the worked reference plane as a supporting surface of the mold material. Additionally, the currently presented claims also require a display means for displaying an envelope model of the mold material generated based on the mold design data, an operation means for bringing the envelope model into close proximity of the mold model by moving the envelope model in directions of three axes orthogonal to one another and rotating it around the three axis. Since neither JP '783 nor the Watanabe reference disclose these features, it is respectfully submitted that the presently claimed invention is clearly patentably distinguishable over the combination of these references.

Langer et al discloses a method for use in casting technology in which the geometry of the cast part is provided as a digital pattern and an inverse pattern for the lost casing mold including any core that is generated from the digital pattern. However, this reference does not provide any teachings of the features of the present invention which are missing from JP '783 and Watanabe et al. That is, this reference has no disclosure with respect to a computing means for a computing data for making the mold working machine work the product forming plane with the worked reference plane as a supporting surface of the material in the mold working machine. Additionally, this reference has no disclosure with respect to display means for displaying an envelope model of the mold material generated based on the mold design data and operation means for bringing the envelope model into close proximity of the mold model by moving the envelope model in directions of three axis orthogonal to one another and rotating it around the three axes. Therefore, Applicants respectfully submit that Langer et al adds nothing to the previously discussed references and that the presently claimed

invention is patentably distinguishable over the combination thereof.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,


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